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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/004,024	11/16/2001	Ashok N. Rudrapatna	29250-000599	5171
30594	7590	10/18/2004	EXAMINER	
HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195			SHARMA, SUJATHA R	
			ART UNIT	PAPER NUMBER
			2684	

DATE MAILED: 10/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/004,024	RUDRAPATNA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Sujatha Sharma	2684	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 November 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>11/14/02, 7/30/03</u>   | 6) <input type="checkbox"/> Other: _____                                    |

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Foschini [US 2002/0118770].

Regarding claim 1, Foschini discloses a diversity technique for systems employing multi-antenna transmitter, comprising:

- a feed unit receiving data and producing N data streams, where N is atleast two; see Fig. 1 and page 1, paragraphs 4-8, page 2, paragraph 17
- N encoders, each encoder receiving a respective one of the N data streams and producing an encoded data stream; see fig. 1, elements 103-1 to 103-L

Art Unit: 2684

- a multiple input multiple output (MIMO) encoder (element 105 in fig. 1) receiving the N encoded data streams ( $b_1$ - $b_L$ ) and encoding the N encoded data streams into M output data stream for transmission by M antennas (109), where M is at least two.

Regarding claim 2, Foschini further discloses a method wherein each of the N encoders operates according to a same encoding algorithm. See page 1, paragraph 8.

Regarding claim 3, Foschini further discloses a method wherein one of the N encoders operates according to a first encoding algorithm, another of the N encoders operates according to a second encoding algorithm, and the first and second encoding algorithms are different. See page 1, paragraph 8.

Regarding claim 9, Foschini discloses a system wherein the feed unit is a demultiplexer. See Fig.1, element 101.

Regarding claim 10, Foschini discloses a decoding system for a multi-antenna receiver, comprising:

- a multiple input multiple output (MIMO) decoder receiving T data streams and decoding the T data streams into N data streams; see fig. 2,
- N decoders (211 in fig. 2), each decoder receiving a respective one of the N data streams and producing N decoded data streams; see fig. 2

Art Unit: 2684

a combiner (213 in fig. 2) combining the N decoded data streams into an output data stream.

Regarding claim 11, Foschini further discloses a method wherein each of the N decoders operates according to a same decoding algorithm. See page 1, paragraph 8, page 4, paragraph 39.

Regarding claim 12, Foschini further discloses a method wherein one of the N decoders operates according to a first decoding algorithm, another of the N decoders operates according to a second decoding algorithm, and the first and second decoding algorithms are different. See page 1, paragraph 8, page 4, paragraph 39.

Regarding claim 17, Foschini further discloses a system wherein the combiner is a multiplexer. See fig.2, element 213.

Regarding claim 18, Foschini discloses an encoding and decoding system for a communication system having multi-antenna transmitter and multi-antenna receiver, comprising:

- a feed unit ((101 in fig.1) receiving data and producing N data streams, where N is at least two;
- N encoders (103 in fig. 1), each encoder receiving a respective one of the N data streams and producing an encoded data stream;
- a multiple input multiple output (MIMO) (105 in Fig. 1) encoder receiving the N encoded data streams and encoding the N encoded data streams ( $b_1$ - $b_L$ ) into M output data stream

(107 in fig. 1) for transmission by M transmit antennas (109 in fig. 1), where M is at least two;

- a multiple input multiple output (MIMO) decoder receiving T data streams from T received antennas and decoding the T data streams into N encoded data streams; see Fig. 2
- N decoders (211 in fig. 2), each decoder receiving a respective one of the N encoded data streams from the MIMO decoder and producing N decoded data streams; and
- a combiner (213 in fig. 2) combining the N decoded data streams into an output data stream.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4,13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Foschini [US 2002/0118770] in view of Onggosansui [US 2003/0048857].

Regarding claim 4, Foschini discloses all the limitations as claimed. However he does not disclose a system wherein the MIMO encoder operates according to the double space-time transmit diversity [DSTTD] algorithm. Further Foschini discloses a method where the decoding performed is the inverse of that performed by the encoders. See page 1, paragraph 8, page 4, paragraph 39.

Art Unit: 2684

Onggosansui teaches a method of space-time transmit diversity wherein the encoder uses the DSTTD algorithm. See page 1, paragraphs 7,8.

Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to provide the above teachings of Onggosansui to Foschini so that the MIMO decoder uses the DSTTD algorithm for an improved performance of the system.

Regarding claims 5, Foschini as modified by Onggosansui discloses all the limitations as claimed. However he does not explicitly disclose a system where  $N$  is two and  $M$  is four. However, Foschini discloses in fig.1,  $N$  data streams  $b_1$ - $b_L$  and  $M$  (107-1 to 107-4) equal to four. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to have  $N=2$  for an improved performance of the system.

5. Claims 6-8,14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Foschini [US 2002/0118770].

Regarding claims 6-8, Foschini discloses all the limitations as claimed. However he does not explicitly disclose a system with different combinations of  $N$  and  $M$ .

However, Foschini discloses in fig.1,  $N$  data streams  $b_1$ - $b_L$  and  $M$  (107-1 to 107-4) equal to four. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to have a different combinations of  $N$  and  $M$  for an improved performance of the system.



*Conclusion*

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Walton [US 2003/0087673] Method and apparatus for allocating downlink resources in a MIMO communication system

Clop [EP 1 069 707 A1] Transmit diversity transmitter and receiver for radio communication system

Chung [EP 1 207 645 A1] Feedback technique for wireless systems with multiple transmit and receive antennas

Dabak [US 6,775,260] Space Time transmission diversity for TDD/WCDMA systems

Kuchi [US 6,748,024] Non-zero complex weighted space-time code for multiple antenna transmission

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sujatha Sharma whose telephone number is 703-305-5298. The examiner can normally be reached on Mon-Fri 7.30am - 4.00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nay Maung can be reached on 703-308-7745. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2684

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Sujatha Sharma  
September 29, 2004

  
NAY MAUNG

SUPERVISORY PATENT EXAMINER